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ABSTRACT

Academic achievement gain scores (determined through the administration of standardized achievement tests) and socioeconomic data (determined by means of a confidential survey form) were gathered on 1567 randomly-sampled students in Grades 1-10 in a school representing a cross section of all socioeconomic backgrounds. Previous research suggested that students from various socioeconomic backgrounds have differential learning rates during summer vacation. Hotelling's One-Group T Square procedure indicated that the total group of subjects gained significantly from spring testing to fall testing. Additional analysis revealed that only black students exhibited significant growth in achievement. Contrary to previous research, there was no evidence that socioeconomic status was related to the summer change in achievement. Twenty pages of appendices include the survey form and data tables. (Author/SB)

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ACHIEVEMENT, SOCIAL CLASS AND THE SUMMER VACATION

The Effect of the Summer Vacation on the Reading, Language Arts, and Mathematics Achievement of Students from Various Socioeconomic Backgrounds

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Abstract

The purpose of this study was to determine the effect of summer vacation on the reading, language arts, and mathematics achievement gain of students from various socioeconomic levels. Previous research suggested that students from various socioeconomic backgrounds have differential learning rates during summer vacation.

Academic achievement gain scores and socioeconomic data were gathered on a large, random sample of students in Grades 1-10. Hotelling's One-Group T^2 procedure indicated that the total group of subjects gained significantly from spring testing to fall testing. Additional analysis revealed that only black students exhibited significant growth in achievement.

Contrary to previous research there was no evidence that socioeconomic status was related to the summer change in achievement.

Introduction

Formal education is the main activity of most school-aged children for most of the calendar year. Most schools are equipped and staffed to enable children to experience nine months of formal learning. During this period of formal education students from high socioeconomic backgrounds generally demonstrate more gain in achievement than do children from lower socioeconomic backgrounds. (Anderson, 1975, p.379; Herriott, 1966, p.204; Svalastoga, 1965) In May or June, the formal education process is stopped for most children with the closure of the schools. These children then begin approximately three months of summer vacation. How does summer vacation affect the positive relationship between achievement gains and students' socioeconomic levels?

Research is sparse on the effect of summer vacations on children from various socioeconomic levels. A study conducted by Hayes and Grether (1969) suggested that children from middle and lower socioeconomic levels progressed at the same rate during the school year. However, learning during summer vacation declined for children from lower socioeconomic levels while no decline was detected for children from middle socioeconomic backgrounds.

The purpose of this study was to determine the effect of summer vacation on the reading, language arts, and mathematics achievement of students from various socioeconomic levels.

Method

Description of the Population

The population for the study consisted of the approximately 42,000 students enrolled in Grades 1-10 in the Norfolk Public Schools during Spring 1973. These students represented a cross section of all socioeconomic levels. The racial composition of the student population at the time of testing was 51% white and 49% black.

Description of the Sample

The sample for the study consisted of 3000 students randomly selected, 300 at each grade level in Grades 1-10. An additional subsample of 2000 students was randomly selected from the original 3000 students. These 2000 students represented the sample for which socioeconomic data was gathered. A criterion of the design was that no missing data would be allowed for any individual subject. This criterion resulted in the reduction of the original sample of 3000 students to 2666 students, for which complete spring and fall achievement data, age, grade level, race, and sex were present on the students' data records. The additional criterion that all socioeconomic data be present on each student's data record resulted in the reduction of the socioeconomic sample of 2000 to 1567.

Measurement

The Primary I, Primary II, Blue and Green Levels of the Science Research Associates (SRA) achievement tests were administered to

students in Grades 1-6 during Spring 1973. The Sequential Test of Educational Progess (STEP), Levels 3A and 2A, were administered to students in Grades 7-10 during Spring 1973. During Fall 1973 these achievement batteries were administered to the same sample of students that were tested during Spring 1973. Table I summarizes the achievement tests administered in Spring 1973 and again in Fall 1973.

Table 1

Standardized Achievement Tests
Administered at Each Grade Level

Spring 1973		Fall 1973	
Grade	Test Administered	Grade	Test Administered
1	SRA Primary I	2	SRA Primary I
2	SRA Primary II	3	SRA Primary II
3	SRA Primary II	4	SRA Blue Level
4	SRA Blue Level	5	SRA Blue Level
5	SRA Blue Level	6	SRA Green Level
6	SRA Green Level	7	STEP 3A
7	STEP 3A	8	STEP 3A
8	STEP 3A	9	STEP 3A
9	STEP 3A	10	STEP 2A
10	STEP 2A	11	STEP 2A

A confidential survey form was sent home with each of the 2000 students randomly selected as the group for which socioeconomic measures would be obtained. This survey form was accompanied by a

letter to the parents or guardians of each student briefly explaining the purpose of the study and asking the parents or guardians to supply the information requested on the survey form. The completed survey form provided the data for quantifying the educational and occupational level of the head of the household in which the student resided. A copy of the socioeconomic survey form is included in Appendix A.

Achievement Data

The need for a common metric across grade levels and between test batteries led to the decision to convert raw scores to normalized standard scores. The steps used in the conversion of raw scores to normalized standard scores were:

1. Raw scores were obtained through test administration and scoring according to the publishers' manuals.
2. The spring norm tables served as a reference point for all subtests, both spring and fall. With the spring norm tables used as a reference point, raw scores were converted to percentile ranks.
3. The percentile ranks were converted to z-scores by assuming they were percentile points in a normal distribution and assigning the corresponding z-score to each percentile rank.
4. The normalized z-scores were converted to normalized standard scores having a mean of 100 and a standard deviation of 20 in the publishers' norming populations.

The advantages of the resulting normalized standard scores were:

1. The spring testing was a common reference point for all subtest and subgroups.
2. Each subtest, at every grade level, was referenced to a mean of 100 and a standard deviation of 20 in the norming population.

The selection of subtests for analysis was dictated by the focus of the study upon the areas of language arts, reading, and mathematics. For grades 1-6 the SRA language arts, reading and mathematics, total subtest scores were used. The Sequential Test of Educational Progress administered at Grades 7-11 had two subtests in the language arts and mathematics domains as well as one reading subtest. The two mathematics subtest scores, the Math Basic Concepts and the Mathematics Computation, were combined into one mathematics standard score. Similarly, the standard scores on the Mechanics of Writing and English subtests were averaged to form one standardized language arts score. These conversions resulted in one standard score in each of the three domains-reading, language arts, and mathematics-at all grade levels.

Socioeconomic Data

The confidential survey form provided data pertaining to the educational and occupational level of the head of the household in which each student in the socioeconomic sample resided. In addition, data was obtained pertaining to the income level of the family unit.

The primary indicator of socioeconomic status for this study was Hollingshead's Two-Factor Index of Social Position (Hollingshead 1957).

The Two-Factor Index of Social Position was developed in 1957 by August B. Hollingshead. Its purpose was to provide an objective procedure to estimate the positions individuals occupy in the status structure of our society.

Two factors, education and occupation, are used to determine social position. Hollingshead explained that occupation is presumed to reflect the skill and power individuals possess as they perform the many maintenance functions in society and that education is believed to reflect not only knowledge, but also cultural tastes.

The index is computed on the head of a household through a formula using scaled scores for each of the two factors. In Hollingshead's schema, the occupational factor is divided into the following seven categories:

Occupational Scale

1. Higher executives, proprietors of large concerns, and major professionals
2. Business managers, proprietors of medium-sized business, and lesser professionals
3. Administrative personnel, small independent business, and minor professionals
4. Clerical and sales workers, technicians, and owners of little business
5. Skilled manual employees

6. Machine operators and semiskilled employees

7. Unskilled employees

In Hollingshead's judgement, the educational scale is based upon the assumption that persons who have similar educations will tend to have similar tastes and attitudes and that they will tend to exhibit similar behavior patterns. The educational scale is divided into the following seven categories:

Educational Scale

1. Graduate professional training
2. Standard college or university graduation
3. Partial college training
4. High school graduation
5. Partial high school
6. Junior high school
7. Less than seven years of school

Hollingshead used multiple correlation techniques to determine weights for each factor (occupation = 7, education = 4). To calculate the Index score for an individual, he multiplied the scale value for Occupation by a factor weight of seven; and he multiplied the scale value for Education by a factor weight of four. The two weighted scores are then summed, and the total indicated a person's social position. Scores can range from 11 to 77. Hollingshead has indicated that scores can be arranged on a continuum or divided into groups of scores. For the researcher interested in score groups,

Hollingshead suggested the following breakdown of score groups:

Social Class	Range of Computed Scores
I	11 - 17
II	18 - 27
III	28 - 43
IV	44 - 60
V	61 - 77

The socioeconomic data in this study provided two categories of information upon which students could be grouped for purposes of analysis. These two categories were:

1. Social Class, Levels I-V, derived from the Hollingshead Two-Factor Index of Social Position;
2. Income - six categories of income level of the family unit in which the student resided.

Questions to Be Answered by the Study

The primary question which this study addressed was "What is the effect of the summer vacation on the reading, language arts, and mathematics achievement of students from various socioeconomic backgrounds?" Using the measured level of achievement in the spring as the basic reference point, the study attempted to ascertain whether the measured change from spring to fall differed significantly among students from five socioeconomic levels. Additionally the following questions were formulated as being related to and of interest in the study:

1. Did the entire sample of students display a significant gain from spring to fall testing in level of achievement in three content areas?

2. Do white students display significant gain from spring to fall testing in the three content areas?
3. Do black students display significant gain from spring to fall testing?
4. Do black students differ significantly from white students in measured change in the three content areas from spring to fall testing?
5. Are there any significant differences among the groups of students classified according to the income level of the family unit in which the student resides?

Statistical Analysis

The units of analysis were the measured changes from spring to fall testing obtained by subtracting the normalized standard scores obtained in the spring testing from the normalized standard scores derived from the fall testing. Richards (1975, p.299) summarizes the rationale for using gain scores when he states, "Simple gain scores measure the true situation about as accurately as other change estimates, are easier to compute, and probably are more meaningful to non-researchers."

A similar rationale was used in selecting the most appropriate statistical analysis for answering the basic questions posed by the study. The questions pertaining to differences among socioeconomic or racial groups were translated into appropriate hypotheses that could be tested using multiple discriminant analysis. Those questions pertaining to a single group were translated into hypotheses that were tested by a one group Hotelling's T^2. Both techniques, multiple discriminant analysis and Hotelling's T^2, are multivariate

tests which allowed the simultaneous testing of the three criterion variables-language arts gain, reading gain, and mathematics gain. For each hypothesis the statistical test provided an initial statistic which indicated whether or not the groups or sample differed significantly on any of the three dependent variables. If the multivariate test were found to be significant, then the appropriate univariate analysis of variance and multiple comparison procedures were used to ascertain which of the three areas-reading, language arts, or mathematics-were responsible for the indicated difference.

All statistical tests were conducted at the .05 level of significance. Corresponding probability values were calculated and presented for each statistical test.

Findings

The major intent of this study was to determine the effect of summer vacation on the achievement of students from various socioeconomic backgrounds. Two major questions were asked in this regard:

1. Did the students as a whole demonstrate a gain or decline in achievement over the summer months?
2. Was there a differential gain or decline in achievement across various socioeconomic groups over the summer months?

Question 1 was answered by testing a random selection of 2666 students in Grades 1-10 (grade designations refer to spring testing grade levels) in the spring and again in the fall of the same year in the areas of reading, language arts, and mathematics, using appropriate forms and levels of the SRA and STEP achievement tests. The spring testing, fall testing, and gain score (fall minus spring) means and standard deviations and the spring-fall correlations related to these testings are presented in Table 2. These data are reported as normalized, standard scores with a mean of 100 and a standard deviation of 20.

Hotelling's One-Group T^2 procedure was used to compare the observed gains with the zero vector, i.e. an expected gain of zero in each of the areas of reading, language arts, and mathematics. The resulting T^2 value was 35.04 with 3 and 2663 degrees of freedom. This T^2 value corresponds to an F-value of 11.67, a significant statistic at the .05 level. As the multivariate F-value was significant, each achievement area was examined independently using a

Table 2

Descriptive Statistics
for Spring and Fall Testings

	Reading	Language Arts	Mathematics
Number of Observations	2666	2666	2666
Spring Mean	89.6	88.4	88.0
Fall Mean	90.3	89.6	89.2
Gain Score Mean	0.7	1.2	1.2
Spring Standard Deviation	19.00	18.83	18.80
Fall Standard Deviation	19.79	19.34	18.09
Gain Score Standard Deviation	13.69	13.69	12.76
Spring-Fall Correlation	.750	.741	.759

dependent t-test. The resulting t-statistics were 2.79, 4.59, and 4.79 for the areas of reading, language arts, and mathematics, respectively. The degrees of freedom for each of these tests were 2665. All three univariate t-statistics were significant at the .05 level, indicating that the students as a whole did demonstrate statistically significant growth in the areas of reading, language arts, and mathematics over the summer months.

The parents or guardians of 1567 students in the study completed a socioeconomic survey allowing these students to be identified with a socioeconomic class using Hollingshead's class

ification scheme. The number of students identified with each social class and the observed gain score means within each class are presented in Table 3. Complete descriptive statistics for achievement scores classified according to the educational and occupational level of the head of the household are presented in Tables 9-14 in Appendix B.

Table 3

Achievement Gains by Social Class

			Spring to Fall Mean Gains		
Socioeconomic Class		N	Reading	Language Arts	Math
I.	High	39	-1.41	-3.23	-2.90
II.	High-Middle	73	.25	-.59	1.37
III.	Middle	167	1.95	.16	-.17
IV.	Low-Middle	884	.76	1.09	.74
V.	Low	404	.99	1.41	1.31

A multiple discriminant analysis using socioeconomic class as the dependent variable and the reading, language arts, and mathematics gain scores as predictor variables was performed to answer Question 2. Table 4 shows that the multivariate F-ratio resulting from this analysis was 1.01 with 12 and 4128 degrees of freedom. This statistic was not significant at the .05 level, indicating there was not a differential achievement gain across socioeconomic classes over the summer.

Table 4

Multiple Discriminant Analysis
Social Class Groups

Source	Value	Degrees of Freedom	Probability
Trace	.0078		
χ^2 Root 1	8.43	6	.21
χ^2 Root 2	2.41	4	.66
χ^2 Root 3	1.29	2	.53
Wilks Lambda	.992		
F	1.011	(12,4128)	.44

The Hollingshead Two-Factor Index of Social Index does not include family income as a component. A multiple discriminant analysis was performed using the six classes of income level of the family and the reading, language arts, and mathematics gain scores. The number of students identified at each income level and the observed gain score means are given in Table 5. Full descriptive statistics for the income level groups may be found in Tables 15-17 in Appendix B.

Table 5

Achievement Gains by Income Level

		Spring to Fall Mean Gain		
Income Level	N	Reading	Language Arts	Math
$0-3999	303	1.28	1.06	1.95
$4000-5999	198	2.40	2.38	2.55
$6000-8999	387	.39	1.34	.20
$9000-11999	269	.55	-.08	.24
$12000-14999	169	-.37	-.01	-.45
$15000-	241	1.06	.42	-.08

Results of the multiple discriminant analysis on income level groups is shown in Table 6. The calculated F-ratio of 1.11 with 15 and 4304 degrees of freedom indicated that there was not a differential achievement gain across income level groups over the summer vacation

Table 6

Multiple Discriminant Analysis
Income Level Groups

Source	Value	Degrees of Freedom	Probability
Trace	.011		
χ^2 Root 1	12.29	7	.09
χ^2 Root 2	3.12	5	.68
χ^2 Root 3	1.21	3	.76
Wilks Lambda	.99		
F	1.11	(15,4304)	.34

A secondary question addressed by this study was "Do black students exhibit a gain or decline in achievement over the summer which is different from the gain or decline in achievement over the summer exhibited by white students?" The descriptive statistics associated with black students in this study are presented in Table 7. Table 8 presents similar statistics for white students.

Table 7

Descriptive Statistics
for Black Students

	Reading	Language Arts	Mathematics
Number of Observations	1286	1286	1286
Spring Mean	81.9	81.4	80.5
Fall Mean	82.8	83.2	82.5
Gain Score Mean	0.9	1.8	2.0
Spring Standard Deviation	15.57	16.43	15.67
Fall Standard Deviation	15.66	16.33	14.72
Gain Score Standard Deviation	13.67	13.81	12.94
Spring-Fall Correlation	.616	.644	.639

Table 8

Descriptive Statistics
for White Students

	Reading	Language Arts	Mathematics
Number of Observations	1379	1379	1379
Spring Mean	96.7	94.9	95.0
Fall Mean	97.3	95.6	95.4
Gain Score Mean	0.6	0.7	0.4
Spring Standard Deviation	19.19	18.67	18.87
Fall Standard Deviation	20.69	20.05	18.76
Gain Score Standard Deviation	13.72	13.56	12.55
Spring-Fall Correlation	.765	.756	.777

A multiple discriminant analysis using the achievement gains to predict race resulted in a multivariate F of 3.10 with 3 and 2661 degrees of freedom. This value was significant at the .05 level. Univariate F-ratios with 1 and 2663 degrees of freedom were then calculated comparing the gains in reading, language arts, and mathematics between the two groups. The resulting F-ratios were 0.17, 3.75, and 9.83 for reading, language arts, and mathematics, respectively. The last two values were significant at the .05 level, indicating the gains exhibited by black students over the summer months in the areas of language arts and mathematics were greater than the corresponding gains exhibited by white students.

This detected black-white difference led to further data analysis in an attempt to determine whether socioeconomic class was a factor in achievement growth over the summer for either of the two racial groups. In effect, Questions 1 and 2 were answered for black students only and again for white students only. The analyses used were identical to the analyses performed for the entire group.

The Hotelling's T^2 analysis for black students resulted in a T^2 statistic of 39.88 with 3 and 1283 degrees of freedom. This value corresponds to a multivariate F-value of 13.27 and was significant at the .05 level. The univariate dependent t-statistics in the areas of reading, language arts, and mathematics were 2.24, 4.53, and 5.51, respectively. The degrees of freedom associated with each univariate t were 1285. All three univariate t-statistics were significant at the .05 level, indicating black students did exhibit significant growth in all three achievement areas over the summer months.

Hotelling's T^2 analysis for white students resulted in a T^2 statistic of 5.30 with 3 and 1376 degrees of freedom. This value corresponds to a multivariate F-value of 1.77, which is not significant at the .05 level. Hence, white students exhibited neither an achievement gain nor an achievement decline during the summer months.

The multivariate discriminant analysis across socioeconomic classes for black students resulted in a multivariate F of 0.44 with 12 and 2027 degrees of freedom. A similar analysis for white students resulted in an F-value of 1.05 with 12 and 2080 degrees of freedom. Neither of these two F-values was significant at the .05

level, indicating socioeconomic class was not a factor in summer achievement growth or decline for either black or white students.

Summary

The group of students involved in this study did exhibit statistically significant growth in each of the three areas of reading, language arts, and mathematics over the summer months. This overall growth is primarily attributable to the growth exhibited by black students. White students, as a group, neither improved nor declined over the summer months.

There was no evidence that socioeconomic status was related to the summer change in achievement.

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Appendix A

Norfolk City Schools

ADMINISTRATION BUILDING. 800 EAST CITY HALL AVENUE
NORFOLK. VIRGINIA 23510

December 17, 1973

Dear Parent or Guardian:

The Norfolk Public Schools requests your help in providing current information concerning our students' variety of backgrounds. By taking a few minutes to fill out the brief attached form, you will provide valuable assistance to the improvement of our educational program.

The information you supply will be held in strict confidence by the Research Department. Therefore, we urge you to complete and return the form as soon as possible.

Thank you for your cooperation and interest in the improvement of the Norfolk Public Schools.

Sincerely,

Albert L. Ayars

Albert L. Ayars
Superintendent of Schools

los

Enclosure

1. Did the child attend summer school or take part in a program run by the public schools last summer?

   _____ a. Yes

   _____ b. No

2. Child named on the envelope addressed to you.

   _____
   Last Name First Name Middle Name

3. Grade in school this year.

   _____

4. Name of school attending this year.

   _____

5. How many persons are living in the home where the child lives? (Check one)

   _____ a. Two (2)

   _____ b. Three (3)

   _____ c. Four (4)

   _____ d. Five (5)

   _____ e. Six (6)

   _____ f. Seven (7)

   _____ g. Eight (8)

   _____ h. Nine (9)

   _____ i. Ten (10) or more

6. What is the highest grade which the male head of household completed?

   _____ a. There is no male head of household

   _____ b. Eighth grade or less

   _____ c. High school incomplete

   _____ d. High school graduate

_____ e. College incomplete

_____ f. College graduate

_____ g. Graduate work

7. What is the highest grade which the child's mother completed?

_____ a. Eighth grade or less

_____ b. High school incomplete

_____ c. High school graduate

_____ d. College incomplete

_____ e. College graduate

_____ f. Graduate work

8. What type of work does the male head of household do? You may not find the exact job listed, but please check the one that comes closest.

_____ a. There is no male head of household

_____ b. Unskilled worker (for example, laundry worker, construction worker, laborer, etc.)

_____ c. Semi-skilled worker (for example, truck driver, machine operator, etc.)

_____ d. Service worker (for example, military non-commissioned officer, policeman, etc.)

_____ e. Skilled worker or craftsman (for example, carpenter, electrician, barber, etc.)

_____ f. Clerical worker, sales worker, technician, etc.

_____ g. Administrative personnel of large firm or owner of small firm, military commissioned officer, etc.

_____ h. Profession requiring a college degree (engineer, school teacher, etc.)

_____ i. Owner, executive of large business or high government agency

_____ j. Profession requiring an advanced college degree (doctor, lawyer, college professor, etc.)

9. What type of work does the child's mother do? You may not find the exact job listed, but please check the one that comes closest.

_____ a. Homemaker

_____ b. Unskilled worker such as laundry worker, etc.

_____ c. Semi-skilled worker (for example, nurse's aide, etc.)

_____ d. Service worker (for example, hairdresser, waitress, etc.)

_____ e. Skilled worker such as hair stylist, baker, etc.

_____ f. Clerical worker, sales worker, bookkeeper, secretary, etc.

_____ g. Administrative personnel of large firm or owner of small firm, military commissioned officer, etc.

_____ h. Profession requiring a college degree (engineer, school teacher, etc.)

_____ i. Profession requiring an advanced college degree (doctor, lawyer, college professor, etc.)

10. Considering all sources of income and all salaries, what was the approximate total family income last year (before any deductions)?

_____ a. Less than $4,000 ($0-$76 a week)

_____ b. $4,000 - $5,999 ($77-$115 a week)

_____ c. $6,000 - $8,999 ($116-$173 a week)

_____ d. $9,000 - $11,999 ($174-$230 a week)

_____ e. $12,000 - $14,999 ($231-$288 a week)

_____ f. $15,000 - and over ($289 and over a week)

Appendix B

TABLE 9

READING ACHIEVMENT AND EDUCATIONAL LEVEL OF

HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Eighth Grade or Less	306	80.59	16.44	81.62	16.16	1.03	14.38	.611
Partial High School	412	84.50	16.15	85.12	16.95	.62	13.40	.673
High School Graduate	541	93.72	19.22	94.82	19.80	1.10	13.51	.761
Partial College	188	96.14	10.05	97.50	20.09	1.36	13.39	.767
College Graduate	55	104.93	15.85	103.06	20.27	-1.87	14.18	.718
Graduate Professional Training	65	110.43	18.38	110.94	20.55	.51	11.36	.835

TABLE 10

LANGUAGE ARTS ACHIEVEMENT AND EDUCATIONAL LEVEL OF HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Eighth Grade or Less	306	79.49	17.10	81.58	16.31	2.09	14.87	.604
Partial High School	412	84.18	16.90	85.39	18.20	1.22	13.88	.690
High School Graduate	541	93.16	17.74	93.87	19.61	.71	12.87	.767
Partial College	188	95.13	18.91	95.25	20.10	.12	14.07	.742
College Graduate	55	101.33	14.86	102.86	18.94	1.53	11.24	.805
Graduate Professional Training	65	109.40	16.42	105.72	19.72	-3.68	11.52	.812

TABLE 11

MATH ACHIEVEMENT AND EDUCATIONAL LEVEL OF

HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Eighth Grade or Less	306	79.71	15.89	81.93	16.66	2.22	12.66	.698
Partial High School	412	83.05	17.22	84.84	16.49	1.79	13.09	.699
High School Graduate	541	92.58	17.94	92.44	18.53	-.14	12.08	.781
Partial College	188	95.51	18.25	94.63	17.91	-.87	11.51	.798
College Graduate	55	101.69	16.96	101.93	16.96	.24	10.10	.823
Graduate Professional Training	65	107.65	20.85	106.95	20.30	-.69	13.83	.774

TABLE 12

READING ACHIEVEMENT AND OCCUPATIONAL LEVEL OF

HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Unskilled Employees	115	80.87	15.00	82.07	16.92	1.20	13.24	.662
Semiskilled employees	617	89.55	18.52	90.47	18.63	.91	13.03	.754
Skilled Manual and Service Employees	451	85.02	18.43	85.86	18.91	.84	14.43	.701
Clerical, Sales, and Technical Employees	144	93.33	16.93	93.72	18.15	.40	14.27	.671
Administrative Personnel & Small Business Owner	131	101.01	18.78	103.05	20.04	2.05	13.39	.764
College Degree Profess., Middle Management Exec.	57	105.95	20.01	105.98	21.48	.04	13.78	.782
Higher Executives, Advanced Degree Profess.	52	107.46	18.88	106.50	22.54	-.96	11.53	.860

TABLE 13

LANGUAGE ARTS ACHIEVEMENT AND OCCUPATIONAL LEVEL OF HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Unskilled Employees	115	82.30	17.60	82.81	17.77	.51	14.91	.645
Semiskilled Employees	617	88.50	17.76	89.88	19.18	1.38	13.01	.755
Skilled Manual and Service Employees	451	84.57	18.62	85.83	18.90	1.26	14.75	.691
Clerical, Sales, and Technical Employees	144	92.34	17.84	92.40	18.53	.06	13.32	.732
Administrative Personnel & Small Business Owner	131	99.69	17.31	100.12	19.63	.44	12.95	.761
College Degree Profess., Middle Management Exec.	57	104.60	18.74	103.67	20.82	-.93	10.35	.868
Higher Executives, Advanced Degree Profess.	52	104.71	16.81	102.77	19.59	-1.94	13.19	.748

TABLE 14

MATH ACHIEVEMENT AND OCCUPATIONAL LEVEL OF

HEAD OF HOUSEHOLD

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Unskilled Employees	115	81.29	16.93	82.48	17.72	1.19	13.11	.715
Semiskilled Employees	617	88.13	18.01	88.43	18.35	.30	12.53	.763
Skilled Manual and Service Employees	451	83.86	17.72	85.65	16.79	1.80	12.03	.758
Clerical, Sales, and Technical Employees	144	93.08	17.57	93.46	16.52	.38	13.01	.710
Administrative Personnel & Small Business Owner	131	99.28	19.13	99.15	19.68	-.13	12.08	.807
College Degree Profess., Middle Management Exec.	57	102.79	18.56	103.05	18.33	.26	11.88	.793
Higher Executives, Advanced Degree Profess.	52	104.40	20.76	103.56	20.57	-.85	13.43	.789

TABLE 15

READING ACHIEVEMENT AND INCOME LEVEL

OF FAMILY

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Less than $4,000 per yr.	303	80.581	15.219	81.861	14.950	1.281	13.769	0.584
$4,000-$5,999 per yr.	198	82.086	16.600	84.490	16.540	2.404	12.406	0.720
$6,000-$8,999 per yr.	387	88.982	18.602	89.370	19.712	0.388	14.179	0.728
$9,000-$11,999 per yr.	269	94.253	18.817	94.803	20.161	0.550	13.726	0.754
$12,000-$14,999 per yr.	169	94.728	18.642	94.361	18.999	-0.367	13.229	0.753
$15,000-up per yr.	241	102.614	19.140	103.676	20.891	1.062	13.321	0.782

TABLE 16

LANGUAGE ARTS ACHIEVEMENT AND INCOME LEVEL

OF FAMILY

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Less than $4,000 per yr.	303	80.508	17.422	81.568	15.901	1.059	14.593	.620
$4,000-$5,999 per yr.	198	83.106	16.781	85.490	17.083	2.384	13.973	.660
$6,000-$8,999 per yr.	387	88.612	18.701	89.953	19.795	1.341	12.925	.776
$9,000-$11,999 per yr.	269	92.528	18.159	94.450	21.138	-0.078	14.266	.746
$12,000-$14,999 per yr.	169	93.379	16.728	93.373	18.517	-0.006	12.019	.772
$15,000-up per yr.	241	100.245	18.065	100.664	19.848	0.419	13.440	.753

TABLE 17

MATH ACHIEVEMENT AND INCOME LEVEL

OF FAMILY

Classification	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Less than $4,000 per yr.	303	78.502	15.120	80.452	14.374	1.950	12.348	0.650
$4,000-$5,999 per yr.	198	82.540	17.012	85.086	16.557	2.545	11.333	0.772
$6,000-$8,999 per yr.	387	87.801	18.617	88.003	18.560	0.202	13.089	0.752
$9,000-$11,999 per yr.	269	93.487	18.560	93.725	18.835	0.238	12.292	0.784
$12,000-$14,999 per yr.	169	93.065	17.227	92.615	17.517	-0.450	12.307	0.749
$15,000-up per yr.	241	100.647	18.310	100.573	18.987	-0.075	12.514	0.773

TABLE 18

READING ACHIEVEMENT AND SUMMER SCHOOL ATTENDANCE

Group	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Attended Summer School	247	86.25	18.23	86.57	19.04	.32	13.44	.741
No Summer School	1319	90.83	19.47	91.80	20.05	.97	13.61	.763

TABLE 19

LANGUAGE ARTS ACHIEVEMENT AND SUMMER SCHOOL ATTENDANCE

Group	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Attended Summer School	247	85.93	18.35	86.90	18.02	.98	13.94	.706
No Summer School	1319	89.96	18.99	90.84	20.06	.87	13.57	.760

TABLE 20

MATH ACHIEVEMENT AND SUMMER SCHOOL ATTENDANCE

Group	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
Attended Summer School	247	84.04	18.00	85.34	17.08	1.31	13.40	.709
No Summer School	1319	89.77	19.06	90.38	18.90	.62	12.27	.791

TABLE 21

READING ACHIEVEMENT BY GRADE LEVEL

Grade Spring	Grade Fall	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
1	2	225	87.43	19.26	89.82	19.46	2.39	14.98	.701
2	3	206	94.96	18.69	95.37	22.60	.41	14.87	.756
3	4	320	91.10	18.83	89.34	18.54	-1.76	14.11	.715
4	5	274	90.20	18.49	90.46	18.44	.26	11.10	.819
5	6	354	88.68	18.74	91.27	18.51	2.59	9.49	.870
6	7	302	89.46	19.78	89.62	20.73	.16	14.51	.745
7	8	299	86.83	15.19	86.62	19.26	-.21	15.19	.623
8	9	256	87.74	19.61	87.93	18.07	.19	15.17	.679
9	10	177	89.24	18.39	90.91	18.88	1.67	14.88	.681
10	11	253	91.21	22.15	93.60	22.99	2.39	9.10	.919

TABLE 22

LANGUAGE ARTS ACHIEVEMENT BY GRADE LEVEL

Grade Spring	Grade Fall	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
1	2	225	90.70	19.81	94.13	21.10	3.43	13.61	.780
2	3	206	93.63	20.47	94.87	21.18	1.24	13.95	.776
3	4	320	89.64	19.99	88.88	18.59	-.76	14.28	.728
4	5	274	87.31	19.22	87.45	19.29	.14	11.76	.814
5	6	354	87.46	18.43	91.29	18.36	3.83	10.40	.840
6	7	302	87.45	18.53	86.68	18.10	-.77	13.48	.729
7	8	299	85.94	15.86	85.57	20.19	-.37	16.22	.611
8	9	256	86.46	18.17	87.16	19.25	.70	15.04	.678
9	10	177	88.15	19.12	92.51	17.02	4.36	14.75	.672
10	11	253	88.87	18.64	90.76	18.61	1.89	8.56	.894

TABLE 23

MATH ACHIEVEMENT BY GRADE LEVEL

Grade Spring	Grade Fall	N	Spring Mean	Spring Standard Deviation	Fall Mean	Fall Standard Deviation	Gain Score Mean	Gain Score Standard Deviation	Spring--Fall Correlation
1	2	225	88.29	20.44	91.35	19.55	3.06	12.09	.818
2	3	206	88.76	24.05	89.62	23.93	.86	16.23	.771
3	4	320	84.12	20.33	87.67	17.86	3.55	15.52	.677
4	5	274	87.26	18.54	87.23	18.04	-.03	11.54	.801
5	6	354	87.54	17.90	88.85	17.26	1.31	11.30	.794
6	7	302	87.78	18.24	88.35	16.13	.57	12.76	.731
7	8	299	88.61	15.34	89.37	14.40	.76	12.36	.656
8	9	256	87.98	17.13	88.49	17.56	.51	11.45	.782
9	10	177	89.20	17.80	90.76	18.11	1.56	12.93	.741
10	11	253	92.19	18.11	91.82	19.21	-.37	10.42	.846